

No man is an island: Evolution before Darwin and Wallace

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Abstract

Darwin and Wallace did not publish their Theory of Evolution in an intellectual or conceptual vacuum. The confrontation between a static and dynamic view of the world harks back to the beginning of speculative thought. The nature of the organic world played a role in these early debates and, once Biology came into existence, would become a focal point of attention.

I propose a sketch of the thoughts and ideas on organismic change from the earliest Greek “Phusikoi” through the ages up to Darwin and Wallace’s time. Charting the evolution of Evolution as a concept should help and illuminate the climate and context in which Darwin and Wallace proposed their important theory.

Keywords: evolution, history of ideas; Darwin; Wallace

Introduction

The concept of organismic evolution proposed by Darwin and Wallace did not appear in a vacuum. To understand the intellectual climate in which their theory was proposed, we need to see how it evolved.

To cover 2 millenia of thought, theories and philosophies would be a titanic task and to do so within the confines of a short paper is impossible. What is possible is to try and see if we can, by means of some eclectic and hopefully judicious highlights and roadsigns, not only chart but also understand how we moved from myth to scientific theory.

Before we begin, I want to point out that there are a few things we have to be aware of and which we should keep in mind. Most of the concepts we take for granted today are mental pictures that came slowly and fitfully into being (for example, biology as a concept was first proposed in 1802 by Lamarck). As we come across yet another confused and confusing attempt to explain what we would now call a concept, more often than not that person was contributing to the fashioning of the building blocks *we* use almost unconsciously today. Let us also not forget that the tools we use to think with did not always exist either: there was a time *before* logic. And lastly, a lot of the information, of the basic data to think about, was not known.

Let us now begin, at the beginning ...

The Classical World

In the beginning was the word. And the word was myth, or religion. For the first attempts to understand the world, for the beginning of rational thought, we have to

turn to Ancient Greece. The myths and religion which made up the world of thought can be seen quite well in the works of Hesiod and Homer, both whom lived around 700 BC. For them, Chaos was the first principle, from which came Earth and Eros and from them, the other Gods. Under various guises, this is the familiar story of a cosmogony centred around a deity (or deities), who ends up creating the world.

The Pre-Socratics

Around 600 BC, something happened in Ancient Greece, that allowed the first attempts towards Philosophy and towards Science. The very first, tentative steps are taken towards speculation on a material origin and evolution of the Universe. To give you a flavour of some of these earliest attempts, here is what Anaximander proposed:

Anaximander (610–550 BC) said that in the beginning, men were born from creatures of a different sort, because the other animals quickly managed to feed themselves, but man alone requires a long period of nursing; hence had he been like that in the beginning too, he would never have survived (Pseudo-Plutarch, A 10).

Anaximander said that the first animals were born in the moisture, surrounded by prickly barks; and that as they reached maturity they moved out on to the drier parts where their bark split and they survived in a different form for a brief while (Aetius, A 30)

At first, they say, the whole area around the earth was moist, and as it was dried by the sun the part which vaporised made the winds and the turnings of the sun and the moon, while what was left is the sea; that

is why they think that the sea is becoming smaller as it dries out, and that in the end it will at some time all be dry (Aristotle, *Meteorologica* 353b6-11, A 27).

A truly remarkable fragment relates the thoughts and ideas of Anaximander's contemporary, Xenophanes (570–490 BC), coupling observation with reasoning:

Xenophanes thinks that a mixing of the earth with the sea is occurring, and that in time it is being dissolved by the moist. He says he has the following proofs: shells are found in the middle of the land and in the mountains, and he says that near Syracuse in the stone quarries there have been found impressions of fish and of seals, and on Paros an impression of laurel in the depth of the rock, and in Malta prints of all sea creatures. And he says that all this happened some time ago when everything was covered in mud, and that the impressions dried in the mud (Hippolytus, 21 A 33).

Empedocles (490–435 BC) wrote a substantial poem *Concerning Nature*, which dealt with the natural world and its production. Barnes (1979) described the zoogony of Empedocles as strange and disputed (see 31 B57-62, Aetius A72); but points out that Empedocles surely held both that the earliest living creatures were very different from those with which we are familiar, and also that many of those earlier creatures were, for various reasons, incapable of surviving and perpetuating themselves. The Aristotelian doctrine of the immutability of species later gained a stranglehold on men's minds; and it is only just that we should honour Anaximander and Empedocles for their insight.

Heraclitus (540–485 BC) is and has been regarded by most as a hermetic, oracular philosopher. These two fragments illustrate his oracular tendency, but also portray his anti-static world view rather well.

Heraclitus says that everything moves and nothing rests (Cratylus 402A, A6);

Cold things grow warm, warm grows cold;
wet grows dry; parched grows moist (B 126, 42 M).

Discussion

These writings seem alien, strange, and far removed from what we would nowadays consider to be rational, scientific discussion. We should remember though just how little of the original texts have survived to the present day. A scrap of papyrus here and there, some fragments cited by someone else centuries later, and then more often than not, distorted to suit the purposes of the writer.

Classical scholars have spent a multitude of pages on these scraps, trying to get a better grasp at the intent of its authors. We therefore know that it is certainly not right to see in Anaximander a pre-Darwinian selectionist. However, there is an embryonic thought that says that the development of living creatures was determined by the nature of their environment. And that is a very different answer to the question of how did living

creatures first come into being and propagate, particularly when compared with the usual answer of immutably fixed ones at their creation by a deity. For that, we owe gratitude to the Ionian Anaximander and Empedocles, the first natural philosophers.

Plato and Aristotle

By the time of Plato and Aristotle, things have changed a lot. The explorations by the Ionians, their questions and attempts to answer them was driven by their wish for a better understanding how the world worked. The methods they developed, a proto-logic and proto-rhetoric came under severe attack by the Eleatic School. Parmenides and Zeno exposed fundamental problems in the Ionian logic, which threatened the entire endeavour of philosophical enquiry. The sophists would take this even further and subvert the endeavour to develop sophistry, for their own gain as well as that of their patrons.

Plato, followed by Aristotle, went into battle against this sophistry in an attempt to rescue rational thought. Their valiant efforts were ultimately successful, but there were quite a lot of casualties. There is a vast corpus of literature on the works of Plato and of Aristotle and, unlike that of the Pre-Socratics, well known. I shall therefore limit myself and just touch upon some of their results with direct relevance to this paper.

Plato (428–355 BC) developed Idealism, the theory of the forms. His simile of the cave in *The Republic* describes very effectively the idea that, say, that horse there is just a reflection of the ideal Horse, and that it is that ideal Horse which really exists.

Aristotle (384–322 BC) modified Plato's views and developed what came to be known as Essentialism. There is a stream in modern times, of philosophers who argue that Aristotle's philosophy is not as rigidly essentialist as it is usually portrayed (notably Balme, Grene, Lennox).

Neither Plato nor Aristotle were particularly exercised by questions about biological diversity and its genesis. The systems they developed could be used, and were used, to cover the organismic world, but that was not their primary intent.

Their philosophical systems certainly lead to a fixist, if not creationist view of what we would call organismic diversity. If this seems somewhat unfair compared to the generous treatment of the Pre-Socratics, please bear in mind that we have most of the corpus of these two philosophers, and the hundreds and hundreds of pages are consequently very eloquent as to the intent of their authors.

Theophrastus (371–287 BC) was first a fellow pupil of Aristotle at Plato's Academy, and became a life-long friend, eventually taking over the Lycaean after Aristotle's death. He wrote in effect the first botanical works. In these, not a trace of evolutionary thinking can be detected, even as he makes Aristotle's ideas *practical*, a constant concern of his. He also wrote a substantial doxography, covering a great many of the Pre-Socratics, which was to give us a little bit more from that well.

It may be worth taking a closer look at Lucretius (99–55 AD). He is often mentioned as a precursor of Darwin, and he used to attract a substantial amount of ire from

the creationism-inclined (Oxford University banned Lucretius' book for many years as being too dangerous for students), that is, until Darwin became a much more attractive target. In his *De rerum natura*, Lucretius tried to show that all life, (animal as well as human), and all of human culture and society were the products of the interaction between chance and necessity over time, owing nothing to God.

Lucretius follows the ideas of Empedocles and Democritus through Epicurus. He stands firmly on the side of the anti-teleological atomists, and against Plato (particularly against the *Timaeus*), Aristotle and the Stoics (all teleologists to varying degrees).

His zoogony appears to lean heavily on Empedocles, but the trail is seriously muddled by Plato's subversion of presocratic orthodoxy (in which a trend can be detected which views cosmogony, zoogony and anthropogony as part of the same process). Plato tried to isolate cosmogony, while Lucretius attempted to bring cosmogony back into the anti-teleological fold. Lucretius incorporated, in particular, Empedocles's views that the creation of life was random and undirected and that the number of species was reduced by the extinction of the less adapted forms, giving a nicely non-teleological process to explain the presence of (well adapted) species.

Lucretius is clearly anti-creationist but it is more difficult to portray him as an evolutionist. True, he put forward anti-teleological and mechanistic processes to explain the origin of species, but he does not allow for evolution of one species from another. Ironically, extinction plays a crucial role in his anti-creationism (whereas Cuvier will later use it to support his creationist view). The contribution of Lucretius shows that tension and debates between various factions, indeed, diversity of ideas, was still very much a reality at that time.

Discussion

That is to say, the end of the classical period. By now, the Roman Empire is listing heavily and we know that its end is not far off. Before we move on, let us see what has been achieved.

Biology does not exist as such, neither do concepts of biological species. The ideas of creation, diversity, change and evolution have been more or less articulated, but these are still unclear and often conflated. Nevertheless, a fixist and an evolutionist view of the world have been proposed and are being entertained under a variety of forms. That is about to change, and dramatically so.

The Catholic Church

Pepin and Pope Stephen III make a pact in 754, consolidated fully by Pepin's son Charlemagne, in 774. Charlemagne is crowned Holy Roman Emperor in Rome on Christmas Day, 800 (a title that ended finally with Napoleon), and the alliance between Catholic Church and State is forged. The church-fathers recuperate the teaching of Aristotle, and orthodoxy is brutally enforced. Philosophy, science, any form of more or less free enquiry stops and the Dark Ages begin. For almost a millenium, intellectual darkness reigns.

The Renaissance

The quattrocento sees the rise of a well-to-do merchant class in the city states of northern Italy. They begin to display their wealth by commissioning artists. The Greek world is held up as an example to emulate, and little by little, ancient texts are brought back. Explorations and expeditions are undertaken, all at least officially *ad majoram gloriam dei*. Marco Polo, Columbus, Magellan, and Vasco da Gama sail well beyond the European World. It seems the world isn't flat, after all. The expeditions bring back all manner of wonderful things and tales of difference. More and more questions are being asked. Galilei turns his telescope to the heavens and runs foul of the Church. Copernicus publishes his *De revolutionibus* which is promptly put on the Index. Thomas More and Erasmus promote Humanism. More is executed for his pains and Erasmus is marginalised. Descartes publishes his *Discours des Methodes*. The stranglehold of the Church is being challenged, particularly in France, where *les philosophes éclairés* began to flourish.

A very important figure in the Enlightened Movement is Georges-Louis Leclercq, Comte de Buffon (1707–1788). Through and through Cartesian, he is a-religious, to all intents and purposes free from traditional thought, highly intelligent and original. His *Histoire Naturelle* aimed no less at capturing the history of human knowledge of nature. By giving an account of natural history, to which he added new thoughts of a speculative nature, he wished to provoke reactions and so stimulate further research. He entertained ideas of evolution, which posed few problems to him as he held strong nominalist views on species:

On pourra dire également que le singe est de la famille de l'homme, que c'est un homme dégénéré, que l'homme et le singe ont eu une origine commune comme le cheval et l'âne, que chaque famille, tant dans les animaux que dans les végétaux, n'a eu qu'une seule souche, et même que tous les animaux sont venus d'un seul animal, qui, dans la succession des temps, a produit, en se perfectionnant et en dégénérant, toutes les races des autres animaux. (*Histoire Naturelle*, vol. 4, p. 382)

With such views he got into trouble with the Church and was forced to reaffirm his belief in special creation. This he did, with elegant subtle irony:

Mais non, il est certain, par la révélation, que tous les animaux ont également participé à la grâce de la création, que les deux premiers de chaque espèce et de toutes les espèces sont sortis tout formés des mains du Créateur (id, p. 383)

Buffon inspired and influenced both Erasmus Darwin and Jean Baptiste Lamarck, which explains to a considerable extent why both these men independently arrived at similar ideas. Charles Darwin's suspicions and opinion of Lamarck appear therefore wholly unjustified.

The French Revolution

The French Revolution had a major impact on Europe in many different domains. Many mistakes were made, and the horrors of *La Terreur* are well known. However, quite a number of positive changes came about too. One of these was a loosening of the grip of the Church. The increase in secularisation proved a boon for intellectual inquiry. Scientific activity in particular flourished. However, making the transition from the Ancient Regime to the new order was not at all straightforward and many an honest intellectual ended up on the scaffold. Even if one escaped the guillotine, life was very different and rarely easy.

Jean-Baptiste Pierre-Antoine de Lamarck (1744–1829) lived through these turbulent times, going from Comte de Lamarck to Citoyen Lamarck. It is not well known that it was he who coined the concept of Biology, to a large degree because his eventual Transformationism would be held up to ridicule, especially against Darwin and Wallace's theory.

Lamarck is a complex and interesting figure, and his thoughts and ideas evolved considerably over time. To do this man justice requires a discussion all of its own.

Madeleine Barthélemy-Madaule in her *Lamarck, ou le mythe du précurseur* gives an excellent analysis of Lamarck's contribution to the evolution of evolutionary theory. She shows that his transformationist views were seriously misrepresented (largely due to Cuvier's unpleasant role) and since then misunderstood. Charles Darwin, for one, was scathing. Ironically, he adopted Lamarck's ideas in the very pages of *On the Origin of Species*.

The next step

The Renaissance and the subsequent humanism and enlightenment returned a situation we have encountered before, in Ancient Greece: fixist and evolutionist views, richer and more varied, are once again in the air.

In December, 1831, a young man steps on board a ship, H.M.S *Beagle*, to join Captain FitzRoy – his name is Charles Darwin.

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